

NASA's Aeronautics Research Program

*Pursuing the Frontiers
of Flight*



Dr. Lisa Porter
Associate Administrator for Aeronautics
5 December 2006



The Three Principles

- **We will dedicate ourselves to the mastery and intellectual stewardship of the core competencies of Aeronautics for the Nation in all flight regimes.**
- **We will focus our research in areas that are appropriate to NASA's unique capabilities.**
- **We will directly address the fundamental research needs of the Next Generation Air Transportation System (NGATS) in partnership with the member agencies of the Joint Planning and Development Office (JPDO).**



The New Aeronautics Programs

Fundamental Aeronautics Program

- Subsonics: Fixed Wing
- Subsonics: Rotary Wing
- Supersonics
- Hypersonics

Aviation Safety Program

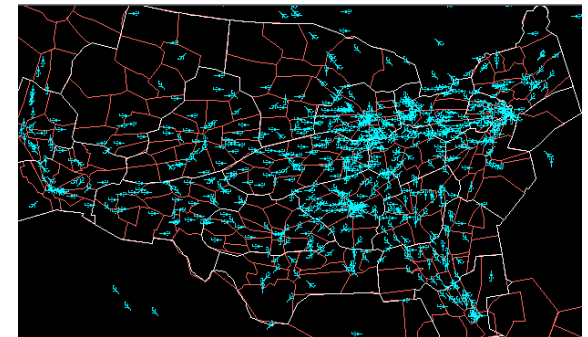
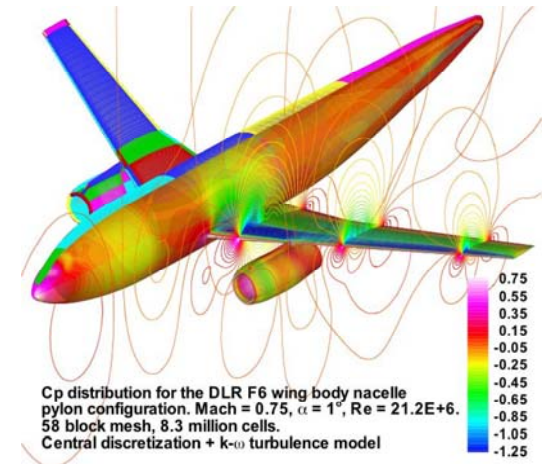
- Integrated Vehicle Health Management
- Integrated Resilient Aircraft Control
- Integrated Intelligent Flight Deck
- Aircraft Aging & Durability

Airspace Systems Program

- NGATS Air Traffic Management: Airspace
- NGATS Air Traffic Management: Airportal

Aeronautics Test Program

- Ensure the strategic availability and accessibility of a critical suite of aeronautics test facilities that are deemed necessary to meet aeronautics, agency, and national needs.

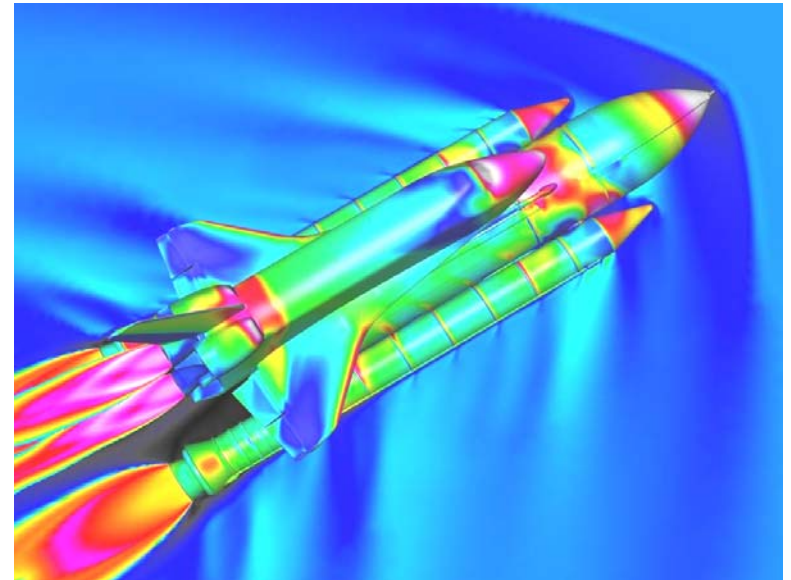




The Link Between Aeronautics Research and Space Exploration

NASA's aeronautics research has historically played and will continue to play a vital role in space exploration.

- Aerodynamics
- Aerothermodynamics
- Flight Dynamics and Control
- Materials & Structures
- Computational Fluid Dynamics
- Multidisciplinary Design Analysis and Optimization (MDAO)



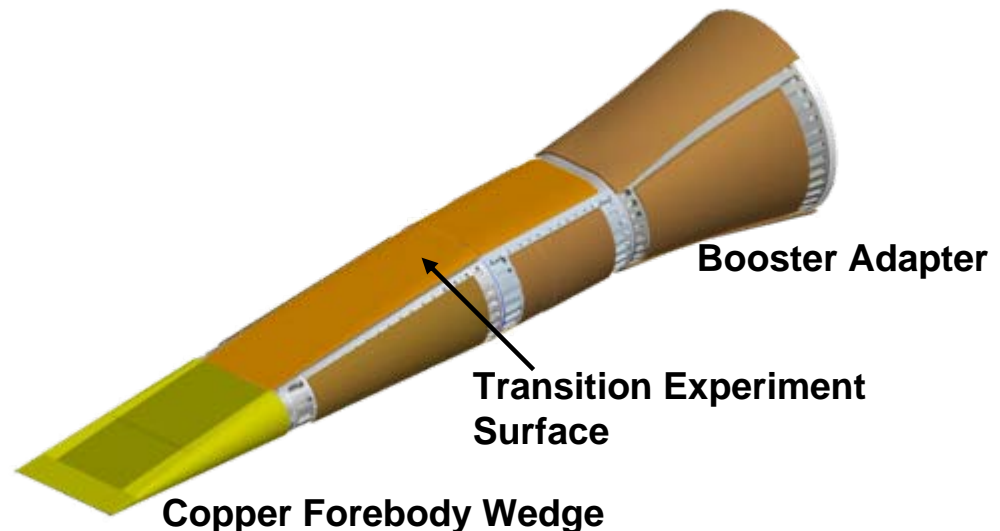
All access to space and all entry through an atmosphere require travel through the hypersonic, supersonic and subsonic regimes.



Hypersonic Boundary Layer Transition (HyBoLT) & Sub-Orbital Aerodynamics Re-Entry Experiments (SOAREX)

STS-114 gap-filler incident served as a potent reminder of the importance of fundamental aeronautics research to space exploration.

- HyBoLT and SOAREX will be launched atop an ATK experimental rocket.
- HyBoLT will collect data on hypersonic flow transition with and without the presence of cavities.
 - Pre-specified Mach/Re trajectory.
 - Enhance the database of reliable validation experiments for flow transition.
- SOAREX will collect aerodynamic data on a re-entry shape during descent.
- Estimated Launch: Summer 2007



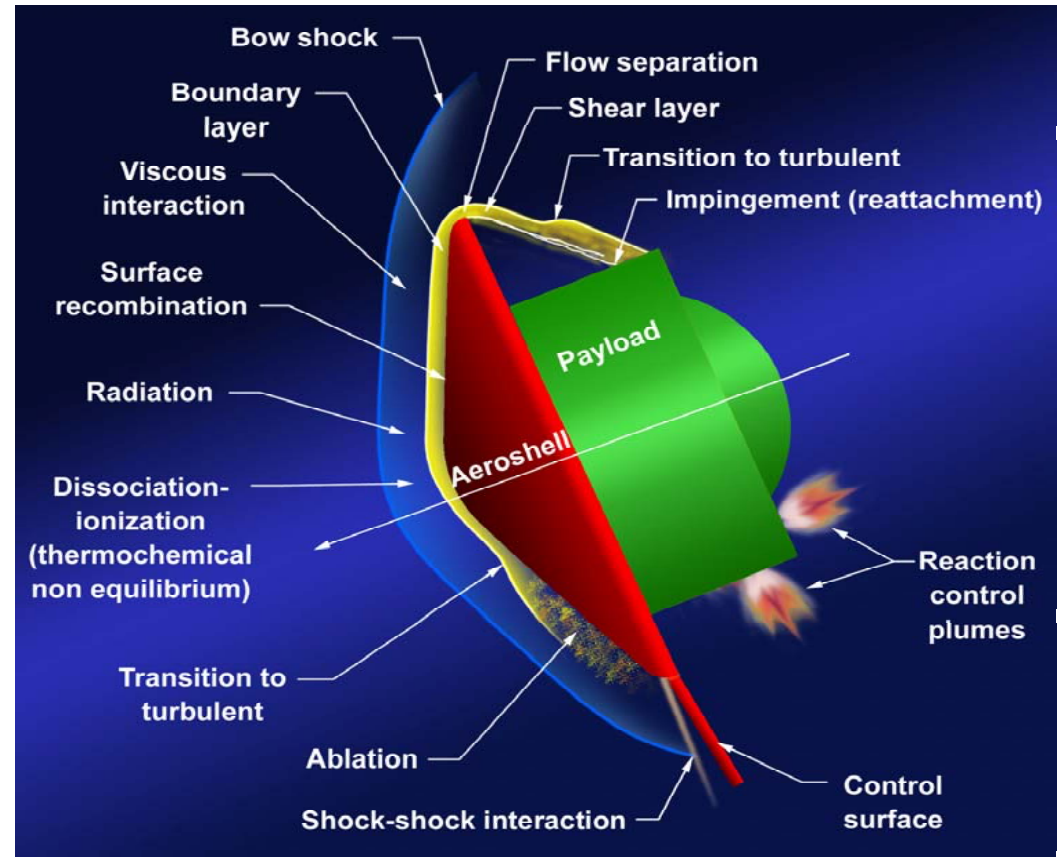


Mars Entry Descent & Landing (EDL)

We will conduct fundamental aeronautics research to help enable the required High-Mass Mars Entry Systems.

E.g.,

- Unsteady separated flow
- Fluid/structure interactions
- Transition & turbulence
- Coupled ablation
- Reacting flow physics
- TPS material characterization
- Supersonic decelerators
- Propulsive deceleration



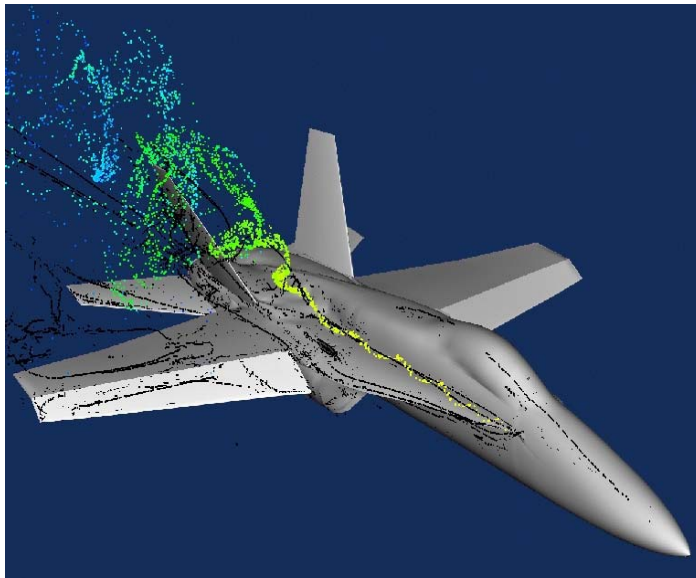


How to find out more

Information about NASA's Aeronautics Research:

www.aeronautics.nasa.gov

- Overview of each Program
- Detailed Project plans with Schedule and Milestones
- NASA Research Announcement (NRA) information





Implementing the Vision

Space Exploration Conference
2006



Backup



Mars Re-Entry by Flight Phase

**Interplanetary Cruise /
Exo-Atmospheric Approach**

Hypersonic Entry

Supersonic Descent

Propulsive Landing

Radiative heating / turbulence

Coupled ablation

Aftbody heating

TPS advancements / warm and hot structures

Deployable/inflatable aeroshells

Alternate shapes

Guidance & control

Angle-of-attack modulation

Aero / RCS interaction

Unsteady aftbody flow mitigation/control

Deployable/inflatable supersonic decelerators

Supersonic decelerators

Pinpoint landing

Hazard detection & avoidance

Hazard tolerance

